

TWO FURTHER NEW SPECIES OF *ABANTIADES* HERRICH-SCHÄFFER (LEPIDOPTERA: HEPIALIDAE) FROM WESTERN AUSTRALIA

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Abstract

Abantiades equipalpus sp. n. and *Abantiades antenniochrus* sp. n. from Western Australia are described, illustrated and compared with other species of the genus.

Introduction

There have been few studies on the hepialid genus *Abantiades* Herrich-Schäffer in Australia. Tindale (1932) published the last revision of the genus, naming 14 species; since then, two further Western Australian species were described by Moore and Edwards (2014). In this paper I describe two additional new species, *Abantiades equipalpus* sp. n. and *Abantiades antenniochrus* sp. n., both also from Western Australia. The terminology used for the genitalia follows Dugdale (2011), while that for wing venation follows Kristensen (1998).

Abbreviations

ANIC – Australian National Insect Collection, Canberra, ACT; SAMA – South Australian Museum, Adelaide, SA; WAM – Western Australian Museum, Perth, WA; WADAF – Western Australian Department of Agriculture and Food, Perth, WA.

Systematics

The genus *Abantiades* was first published by Herrich-Schäffer (1853) and the type species, *A. hyalinatus* Herrich-Schäffer, designated by Kirby (1892).

Tindale (1932) described *Abantiades* thus: ‘Antennae unipectinate often broad and lamellate in males, reduced in females. Labial palpi three-segmented, first and second segments approximately equal, apical one short, about as long as wide and subspherical, maxillary pair reduced, forming ill-articulated protuberances at base of labium. Forewings R1 separating from Rs before the branching of R5; R4 and R5 forked. Hind wings with R4 and R5 branching before the radio-median cross-vein.’

Abantiades equipalpus sp. n.

(Figs 1-2, 4-14)

Types. *Holotype* ♂, WESTERN AUSTRALIA: 2 km W of S Bullabulling, 6 May 1984, E.S. Nielsen and E.D. Edwards (in ANIC). *Paratypes*: 3 ♂♂, same data as holotype (1 ♂ in SAMA; 2 ♂♂ in ANIC); 1 ♂, ‘Ribbleton’, Tambellup, 11 May 1934, H. Driver; 1 ♂, Burngup, 14 May 1934, E. Fleahy; 1 ♀, 69 miles west of Norseman, May 1968, A. Matthews (in WAM).

Other material examined. 1 ♀, no data (in WADAF).



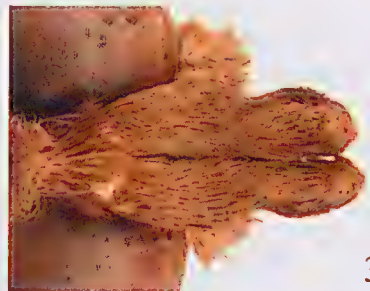
Fig. 1. Adult male (Holotype) of *Abantiades equipalpus* sp. n.: Upperside.

Diagnosis. The only known Western Australian *Abantiades* with brown hindwings and a single white line on the forewing, white in the male, off-white in the female, and the only described *Abantiades* species with the labial palps made up of equal-sized segments.

Description. Male (Fig. 1). Head: dark brown, densely covered in long mid brown hair scales; proboscis, none; labial palpi (Fig. 2) mid brown, three segmented, all segments of equal length, correct; antennae (Fig. 13) with 54-56 segments, unipectinate, reddish ochre, lighter at tip, approximately one third length of costa; rami lamellate with distinct anterior projection; anterior face with distinct concave depression, densely covered in forward pointing white cilia, posterior aspect flat, thinly covered with cilia; at antennal origin rami sub-circular, 2.5-3 x filament width (fw), mid filament, circular, 3-3.5 x fw, at tip, lanceolate 1.5 x fw.

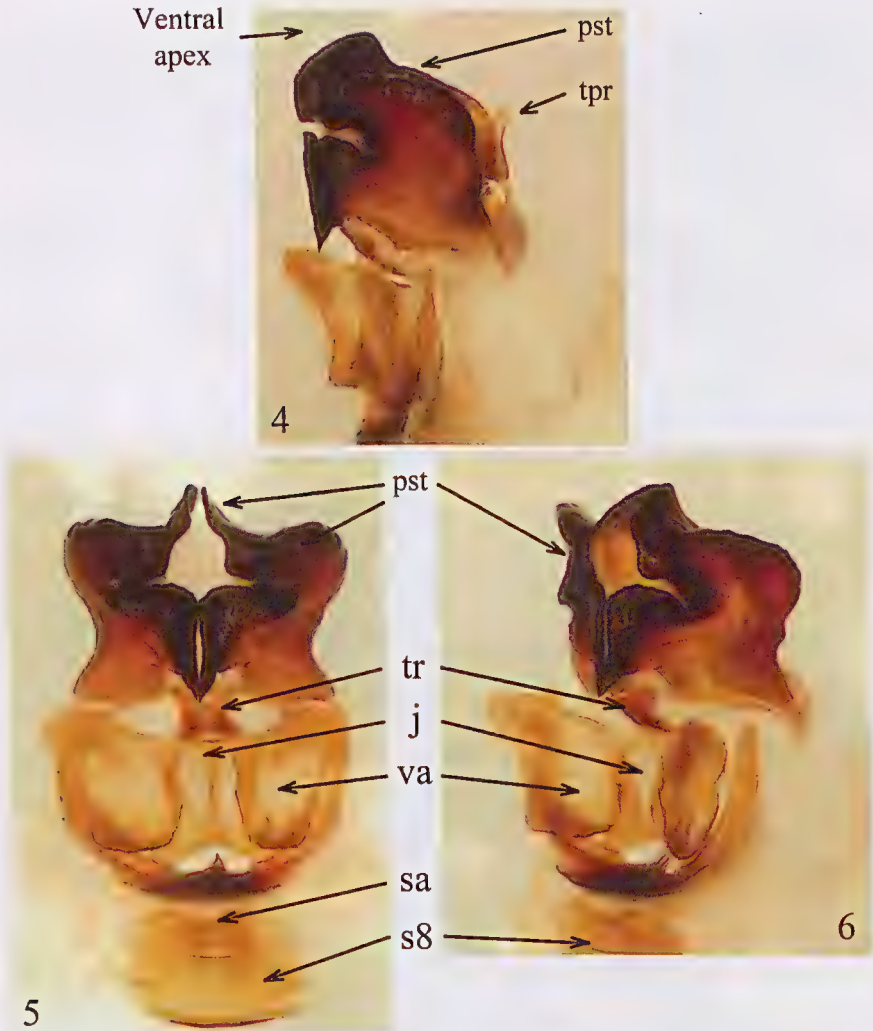


2



3

Figs 2-3. Labial palpi: (2) *Abantiades equipalpus* sp. n. – showing three equal labial segments; (3) *Abantiades antenniochrus* sp. n. – showing the 'normal' arrangement where the apical segment is greatly reduced.



Figs 4-6. Male genitalia of *Abantiades equipalpus* sp. n.: (4) lateral; (5) ventral; (6) ventro-lateral. j, juxta; pst, pseudotegumen; s8, sternite 8; sa, saccus; tpr, twin processes; tr, trulleum; va, valva.

Thorax: mid to dark brown covered in long hair-like scales; legs mid brown.

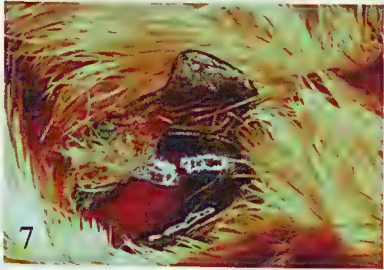
Abdomen: 25 mm; covered in long mid to dark brown hairs.

Forewing: 40-43 mm; costa straight for just over half its length then curving gently to obtuse tip; termen straight for half its length, gently and continuously curved through dorsum to wing origin. Upperside mid to dark brown; single curved white line originating at the subcostal-radial vein

divergence, then straight to the origin of M1, along M1 four-fifths distance to termen then straight to where Rs2 ends at the termen, a few white scales run from this point to the tip, line margin not entire, irregularly edged by darker brown scales, more prominent near origin; posterior half of wing covered with an indistinct scrolling effect. Underside sparsely covered in long mid brown hair scales; upper forewing markings show through forewing.

Hindwing: 32-34 mm; costa straight for two-thirds length, curving quickly, then gently to an obtuse tip; termen straight then curving gently to straight inner wing. Upperside mid to dark brown but slightly lighter than forewing; underside as for forewing.

Genitalia (Figs 4-8): Pseudotegumen heavily sclerotised, ventral projection wedge shaped, tip obtuse rounded, posterior margin long, undulating, smoothly curved, anterior margin short, truncated, anterior process truncated, vertical, tip very acute; lateral processes present, ventrally projected in wide bulbous curve. Trulleum five-pointed, anterior projections lobed, ventral projections pointed; juxta large, posterior margin slightly concave, anterior margin angled; valva somewhat paddle shaped, 'handles' short and thick; vinculum with mid line heavily sclerotised, pointed; saccus deeply V-shaped; Sternite 8 with concave notch in mid-line.



Figs 7-8. Everted portion of pseudotegumen of *Abantiades equipalpus* sp. n.: (7) lateral; (8) anterior ventro-lateral.

Female (Fig. 9). Two females have been associated with *Abantiades equipalpus* (WAM, WADAF). Each has labial palpi with three equal-sized segments, together with the forewing markings and subtle scrolling pattern of male *A. equipalpus*.

Head: dark brown, densely covered in long yellowish to mid brown hair; proboscis absent; labial palpi (Fig. 10) mid brown, three segmented, all segments of equal length, correct, smaller and narrower than in male; antennae (Fig. 13) reddish ochre, approximately one-fifth length of costa, segmented, unipectinate; rami lamellate, face with distinct concave depression, at antennal origin 2 x filament width (fw), sub-circular, at mid filament 1.25-1.5 x fw, ellipsoid, at tip, 1 x fw, lanceolate.

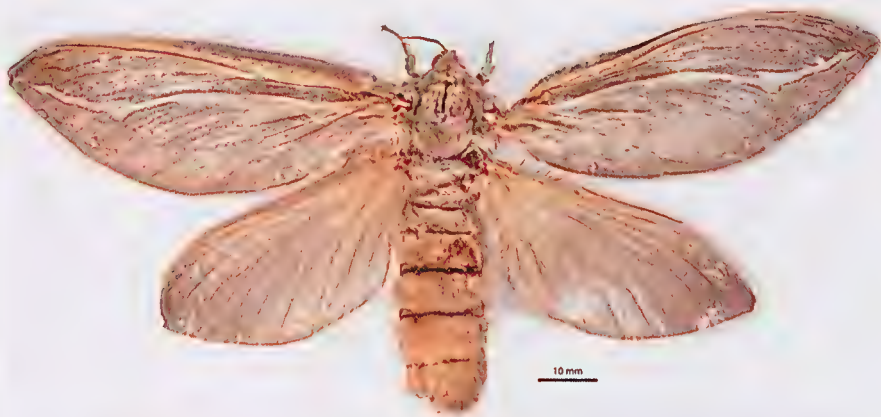


Fig. 9. Adult female (No data, WADAF) of *Abantiades equipalpus* sp. n.: Upperside.



Fig. 10. Labial palpi of female *Abantiades equipalpus* sp. n.

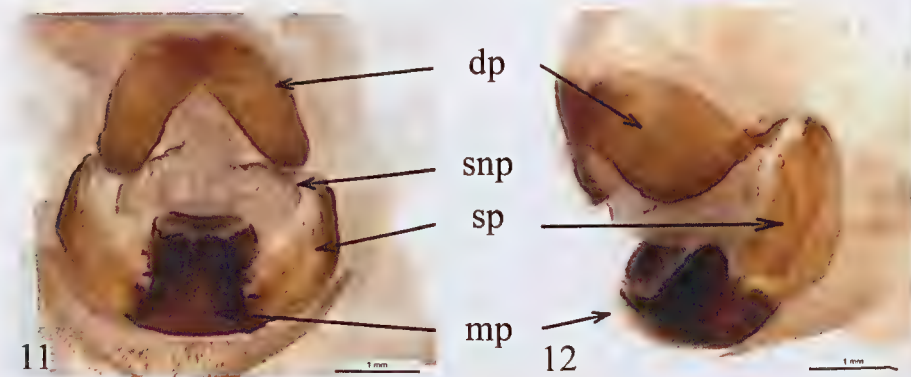
Thorax: covered in light to mid-brown long hairs; legs mid to dark brown.

Abdomen: yellowish to dark brown, clothed in long hair.

Forewing: 55-64 mm, more lanceolate than male. General colour yellowish mid brown to dark brown, the white line present in male replaced by paler brown-white one of similar shape and position, edged in dark brown. Remainder of wing with subdued scroll pattern.

Hindwing: 45-50 mm, mid brown in colour.

Genitalia (Figs 11-12): dorsal plate moderately sclerotised, setae present at the mid point and along the open margin, distinctly three dimensional, posterior margin triangular; sternite 9 made up of the side plates, which are moderately sclerotised and roughly elliptical; median piece heavily sclerotised, distinctly three dimensional, cuboid, with two triangular projections on posterior margin, seta on posterior face.



Figs 11-12. Female genitalia of *Abantiades equipalpus* sp. n.: (11) ventral; (12) ventro-lateral view. dp, dorsal plate; mp, median piece; snp, subanal plates; sp, side piece. Ductus bursae and corpus bursae not shown.



Fig. 13. Antennal segments and rami of *Abantiades equipalpus* sp. n.: (a-c) male: (a) terminal ramus; (b) mid filament rami – side view; (c) mid filament ramus – front view. (d-e) female: (d) mid filament ramus – front view; (e) mid filament rami – side view.

Etymology. From *equipalpus* (Latin): pertaining to the equal lengths of the segments in the labial palpi.

Distribution. Southwestern Western Australia, as in Fig. 14.



Fig. 14. Collection locations of *Abantiades equipalpus* sp. n.

Biology. Nothing is known of the biology of this species.

Comments. There are two other Western Australian *Abantiades* species with which *A. equipalpus* sp. n. might be confused. Like *A. equipalpus*, both male and female *A. albofasciatus* (Swinhoe, 1892) have a well-defined single white line on the forewing; in *A. albofasciatus* the line is angled rather than curved. Males of *A. albofasciatus* have distinctly white hind wings, whereas in *A. equipalpus* the hind wings are brown. Females are more difficult to separate because the females of both species have brown hind wings. As the antennae of the females are also similar, inspection of the labial palpi is required to separate them. As can be seen in Fig. 10, *A. equipalpus* females have three equal-sized labial palpi segments, whereas in *A. albofasciatus* females the 'normal' arrangement of two equal-sized and one short apical segment holds true.

Abantiades equipalpus is also very similar in colouration and patterning to *A. lineacurva* Moore & Edwards, 2014, i.e. brown wings and a long dominant curving white line on the forewing. In *A. lineacurva*, however, there is always a multitude of other white markings on the forewing that make the

prominent line somewhat 'T'-shaped, whereas with *A. equipalpus* there is only the single dominant white curving line but also a subtle scroll-like pattern present that is absent in *A. lineacurva*.

***Abantiades antenniochrus* sp. n.**

(Figs 3, 15-24)

Types. *Holotype* ♂, WESTERN AUSTRALIA: 31.425653°S, 118.426902°E, Goldfields Rd, 400 m E of Eyre Highway, 6.5 km WSW of Burracoppin, 26 April 2014, N.B. Temby (in WAM). *Paratypes*: 3 ♂♂, 31.425653°S, 118.426902°E, Goldfields Rd, 400 m E of Eyre Highway, 6.5 km WSW of Burracoppin, 26 April 2014, N.B. Temby (in Nick Temby Collection); 1 ♂, 31.425653°S, 118.426902°E, Goldfields Rd, 400 m E of Eyre Highway, 6.5 km WSW of Burracoppin, 26 April 2014, N.B. Temby (in Fabian Douglas Collection); 1 ♂, Burngup, 8 June 1934, M. Byass and S. Taylor-Smith; 1 ♂, Pallingup River, May 1914, W.B. Alexander; 1 ♂, Cunderdin, 7 July 1913, Mrs Lundy (in WAM).

Diagnosis. This is the only known *Abantiades* species with dark fore and hind wings and yellow antennae.

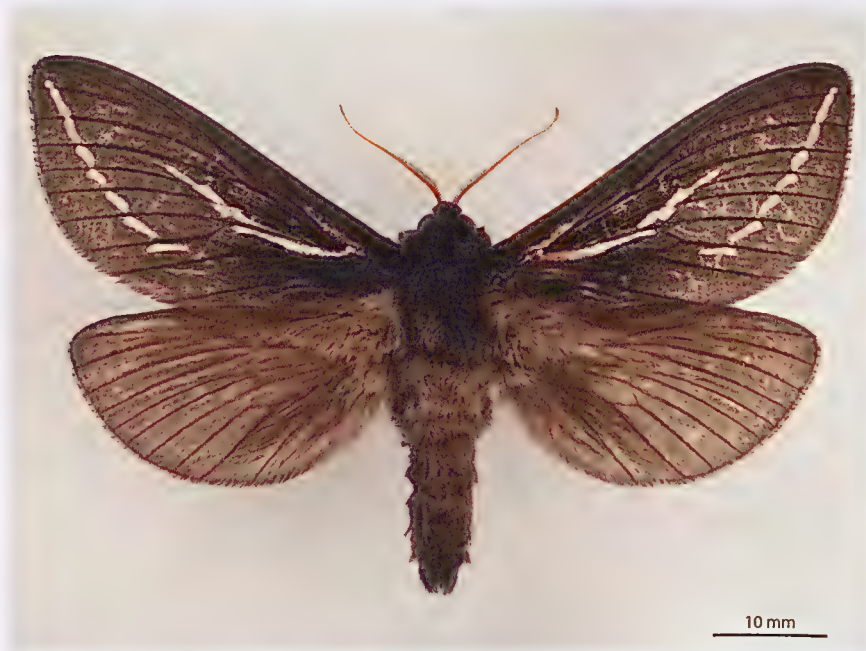


Fig. 15. Adult male (Holotype) of *Abantiades antenniochrus* sp. n.: Upperside.

Description. Male (Fig. 15). Head: blackish, covered in long hairs; proboscis none; labial palpi (Fig. 3) three-segmented, the two basal segments approximately equal in length, apical one shorter, subspherical; antennae

(Fig. 21) with 65 segments, yellow-ochre in colour, unipectinate; rami, at antennal filament origin, obovate, 2 x filament width (fw), mid filament, broad lanceolate 2 x fw, distally, acute lanceolate to terete 1.5 x fw; all densely covered in fine whitish yellow setae, longer outward pointing setae on edges.

Thorax: covered in long blackish hairs.

Abdomen: covered in long dark greyish hairs, lighter towards thorax.

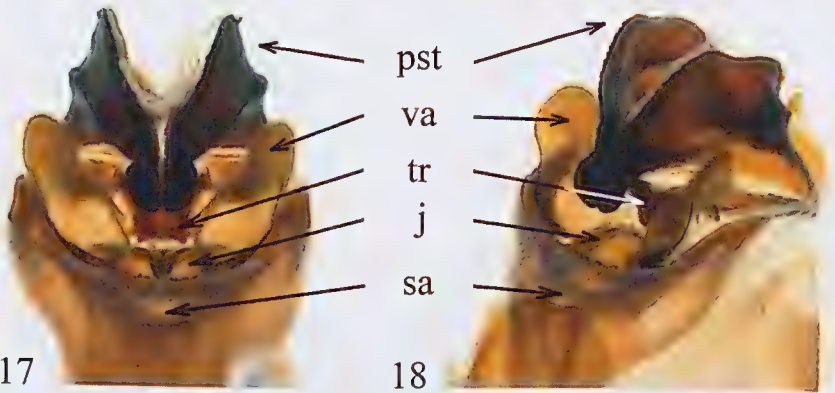
Forewing: 20-42.5 mm, median 35 mm; costa straight for just over half its length then gently continuously curved to obtuse tip, termen straight for half its length thence gently and continuously curved through dorsum to origin of wing. Upperside blackish, greyish black or brownish black with white markings, without intricate scroll-like pattern. Wing markings variable; consistently two white lines; a basal crescentic line, originating in area of darker scales at origins of M and Cu veins, runs beside M/CuA1 until following i-m cross vein, along m-r cross vein, terminating slightly posterior of Rs4; M/CuA1 retaining dark scales traverses this line minimally bisecting it; distal line originating at the end of Rs1 running obliquely to CuA1; subterminal row of 2-5 white elongate spots occupying the inter-vein spaces terminating between CuA1 and CuA2. Underside dark grey to dark brown with muted upper pattern showing through.

Hindwing: 17.5-32.5 mm, median 30 mm; costa straight for 2/3 length, curving rapidly, then gently to an obtuse tip, termen straight, curving gently to straight inner wing. Upperside dark brownish-grey, long hairs at base tending towards brown. Underside as for forewing.

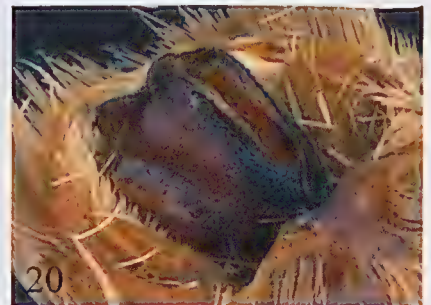
Variation. There is considerable variation in wing colour, size and patterning of the basal and distal forewing lines. General colour can vary from dark charcoal to more brownish black. Forewing basal line continuous (not bisected by dark scales), may be thicker with a more irregular margin, extra white dots or ellipses often present at ends. Distal line very variable, some with narrow almost straight white line, others a series of separated inter-vein ellipses. Number of spots in markings between the two lines varies in number (0-5) and form (points of colour to elongate dots almost forming a line). One male has subterminal spots on the hind wing.

Genitalia (Figs 16-20): Pseudotegumen heavily sclerotized, ventral projection low, curved, posterior face long, gently curved, anterior face long, steeply angled, slight lateral projection, the anterior 'beak', near vertical, distinctly knobbed; twin processes, small, set back with distinctive blunt ending; valvae, near elliptical, basal half slightly wider, distal portion covered with long setae; truelleum pentagonal, anterior projections very small, posterior projections larger; juxta 2.5 x wider than high; saccus deep 'V' shaped.

Female. No females have been located in collections.



Figs 16-18. Male genitalia of *Abantiades antenniochrus* sp. n.: (15) lateral; (16) ventral; (17) ventro-lateral. j, juxta; pst, pseudotegumen; s8, sternite 8; sa, saccus; tpr, twin processes; tr, trulleum; va, valva.



Figs 19-20. Everted portion of pseudotegumen of *Abantiades antenniochrus* sp. n.: (18) rear ventro-lateral; (19) anterior ventro-lateral.

Etymology. From *antenniochrus* (Latin): pertaining to the yellowish colour of the antennae.

Distribution. Southwestern Western Australia, as in Fig. 22.

Biology. Nothing is known of the biology of this species.

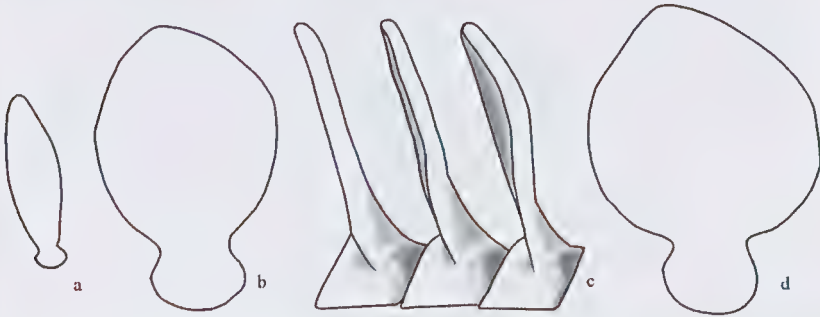


Fig. 21. Antennal segments and rami of *Abantiades antenniochrus*, male: (a) terminal ramus, (b) mid filament ramus – front view, (c) mid filament rami – side view, (d) basal ramus – front view.



Fig. 22. Collection sites of *Abantiades antenniochrus* sp. n.

Comments. This paper was ready to go to press when I discovered that Nick Temby had, on the 26 April 2014, collected five new specimens of *A. antenniochrus*. These fresh specimens dramatically illustrated the tendency of pigment fading in hepialids. Whereas the older specimens (Figs 23-24) were mid brown, the new ones were black, some with and others without a hint of any underlying brown even under close inspection. The specimen selected for the holotype was done on the basis that it best represented the species morphology; it also shows the greatest indication of brown undertones, possessing distinctly brown-coloured scales on the forewings and brown hairs on the hind wings. Whether this decolouration has happened since collection is unsure. In the other specimens the scales and hairs over the entire body are charcoal-black. The black is also present in the grooving between the antennal filaments, making them look darker, and on the genitalia, making them look very black indeed. In the older specimens there is no hint of this blackening, so it will be interesting to see what happens to the colour of these fresh specimens over time. Also of interest was the size variation of the specimens collected. Three matched the three older ones, with a forewing length of about 35 mm, but one was exceptionally large, with a 42.5 mm forewing, and one was extremely small, with a 20 mm forewing length.

Abantiades antenniochrus can be separated from all other *Abantiades* species by its colour, patterning and antennal structure. In Western Australia there are five species that can have two distinct white marks on their forewings. *Abantiades aurilegulus* Tindale, 1932 is about the same size and has two white marks but these lines appear very ragged in outline and the moths have a golden-red colouring; *A. antenniochrus* on the other hand has smoother edged lines and is blackish in colour. *Abantiades leucochiton* (Pfitzner, 1914) also has two large white markings on the forewing but the male has white hind wings and large 'plate-like' rami on the antennae, whereas *A. antenniochrus* has blacker hind wings and smaller lanceolate rami. Both *A. hydrographus* (Felder, 1868) and *A. argentangulum* Moore & Edwards, 2014 also have two white marks but their forewings are distinctly greyish and they are much larger species. In male *A. hydrographus* the white areas are thickly edged with darker scales and have distinctive tan coloured scales in and around the white areas. In male *A. argentangulum* the white areas are larger, almost silver in colour and edged darker; the distal silver/white area is distinctly triangular in shape. The distinctive spade-shaped rami can also be used to separate *A. argentangulum* from *A. antenniochrus*. *Abantiades aurilegulus*, *A. leucochiton*, *A. hydrographus* and *A. argentangulum* all have reddish to blackish coloured antennae, whereas in *A. antenniochrus* they are yellowish. Another Western Australian species, *A. fulvomarginatus* Tindale, 1932, has yellowish antennae but the rami are clothed in long setae, quite different from the small fine ones present on the rami of *A. antenniochrus*. *Abantiades fulvomarginatus* is also smaller, with the forewing covered in a pattern of greyish and whitish shapes and with no white lines present.



23

10 mm



10 mm

24

Figs 23-24. Older specimens of *Abantiades antenniochrus*: (23) Paratype: Burngup – collected 1934 (genitalia removed for imaging); (24) Paratype: Cunderdin – collected 1914. Both specimens demonstrate the loss of colour over time and the variation in the white markings.

Discussion

Tindale's (1932) 'diagnosis' of the genus stated: 'Labial palpi three-segmented, first and second segments approximately equal, apical one short, about as long as wide and subspherical'. This is shown here not to be a valid synapomorphy for *Abantiades* as *A. equipalpus* has all segments of equal size in both sexes.

The genitalia of both male and female *Abantiades equipalpus* are also notable from a generic standpoint. The males have a pseudotegumen that is unusually wide laterally, with a dramatically truncated anterior projection that terminates in an extremely acute tip. The females have a cubic-shaped median piece which, with the highly shaped dorsal plate, holds the whole structure acutely three dimensional (Figs 11-12) even when dissected, whereas in other species the female genitalia become more two dimensional in appearance after dissection. The distinctive genitalia (from a generic standpoint) and the equal-sized labial palp segments lead one to question this species' standing within the *Abantiades* group. The fact that the veins Rs3 and Rs4 are forked seems to place it in the *Abantiades*, *Trictena*, *Bordaia*, and *Oncopera* 'group' and the overall form and structure of the moth, particularly its antennal structure, are distinctly *Abantiades*-like in nature. Knowledge about its biology and behaviour might reveal why it has evolved in the manner it has and may aid in taxonomic placement but, until this knowledge and/or genetic investigation is undertaken, it seems prudent to place it in the genus *Abantiades*.

The two species described here are the least represented in collections. Both appear to have had distributions encompassing the WA wheat belt and lack of past and present collectors and habitat alteration in these regions may certainly be factors in their apparent rarity. The recent collection of *Abantiades antenniochrus* near Burracoppin by Nick Temby is excellent news. Two of the three other known collection sites (Cunderdin and Burngup) have been largely cleared of woodland but the third location, identified imprecisely as 'Pallingup River' still has substantial woodland and collecting around here might yield more material. Collection of *Abantiades equipalpus* by Nielsen and Edwards in 1984 to the east of the wheat belt clearances suggests that populations may still be extant.

Serious collecting efforts by amateur lepidopterists and Government workers in these areas would improve our knowledge and, in turn, drive conservation strategies for these poorly known species.

This paper should strongly remind workers and students that, when working with older specimens of Australian hepialids, care is required when describing colour differences. The appearance of specimens when first caught may be brighter and more colourful or indeed seemingly different in colouring, with some colours fading or disappearing as the specimen ages.

It is the intention of Nick Temby and Fabian Douglas to distribute their paratypes of *Abantiades antenniochrus* to WAM, SAMA and the Museum of Victoria when other specimens are acquired.

Acknowledgements

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